Financial System Design: Principles for Policy and Regulation

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Theory, Data and Recommendations for Thailand: Big Picture Looking Forward

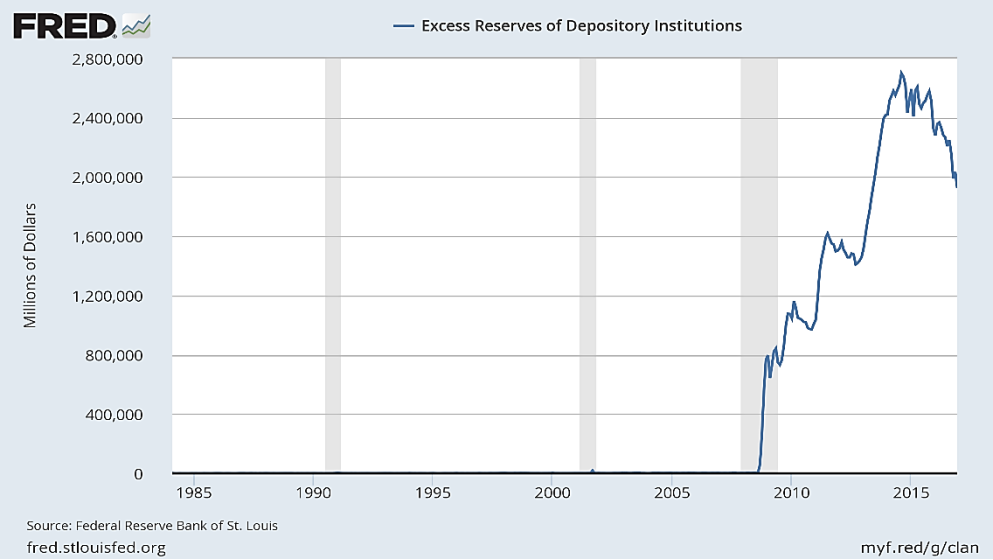
- Two topics
  1. Liquidity, design of payments systems, and monetary policy
  2. Financial intermediation, e-platforms, and regulation
- In each will be talking about theory, data, and policy recommendations
- Special notes for Thailand along the way, and at the end

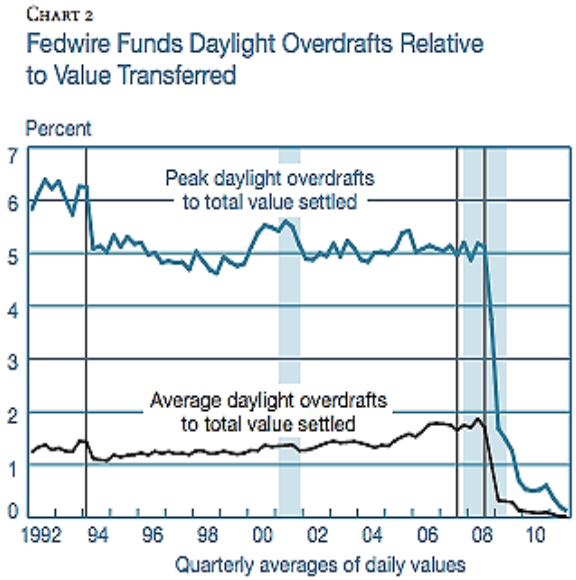
Liquidity, Design of Payments Systems, and Monetary Policy

- Summary of purpose
  - Micro-founded general equilibrium models of liquidity and money provide rich frameworks for
    - Understanding the meaning of institutions and markets
    - Organizing and analyzing data
- All with important operational implications for
  - Design of payment systems
  - For monetary policy

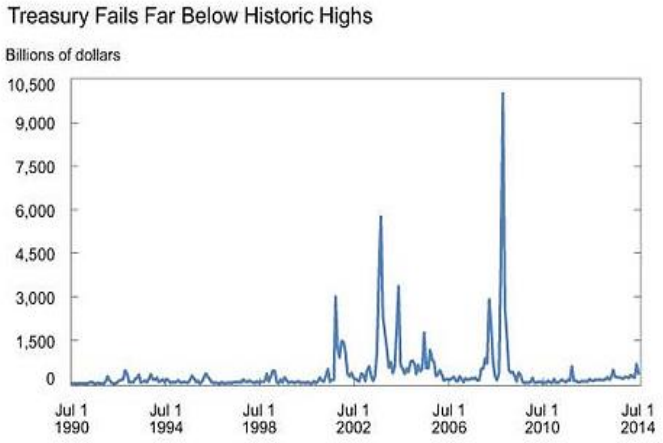
Motivation from US: Fed Balance Sheet to Impact on Micro Markets

- Excess reserves





- From liquidity-saving mechanisms (LSM) and hybrids for clearing to segregated reserve accounts (SBA) to facilitate lending
  - "An Economic Analysis of Liquidity-Saving Mechanisms" (A. Martin, J. McAndrews, 2008)
- Segregated Balance Accounts proposal
  - "Segregated Balance Accounts" (Garatt, Martin, McAndrews and Nosal, 2015)



Links Between Payments and Monetary Policy: A Sparse but Important Literature

- Varying degrees of explicitness, academic and policy frameworks used, overview of some recent literature,

- Central Banks
  - Bank of England: No Link, no integrated framework
  - US Federal Reserve: Primary Dealer Credit Facility, liquidity and central bank balance sheet are merged
- Academic Literature
  - Adrien-Shin (2009): "Money, Liquidity and Monetary Policy"
  - Piazzesi-Schneider (2015): "Payments, Credit and Asset Prices"
  - Bianchi and Bigio (2014): "Banks, Liquidity Mgmt, and Monetary Policy"
  - Lucas and Nicolini (2015): "On Stability of Money Demand"
- Micro Markets, Industrial Organization, and Monetary Policy
  - Roc Armenter (forth.): "Excess Reserves and Monetary Policy Implementation"
  - Drechsler, Savov, and Schnabl (2016): "The Deposits Channel of Monetary Policy"

Motivation from Developing Countries: Micro Back Through Financial Markets and Onto Macro

- Traditional commodity money with fiat money: India
  - Frequency in exchange (Lim and Townsend "General Equilibrium Models of Financial Systems: Theory and Measurements in Village Economies", *Review of Economic Dynamics*, 1998)

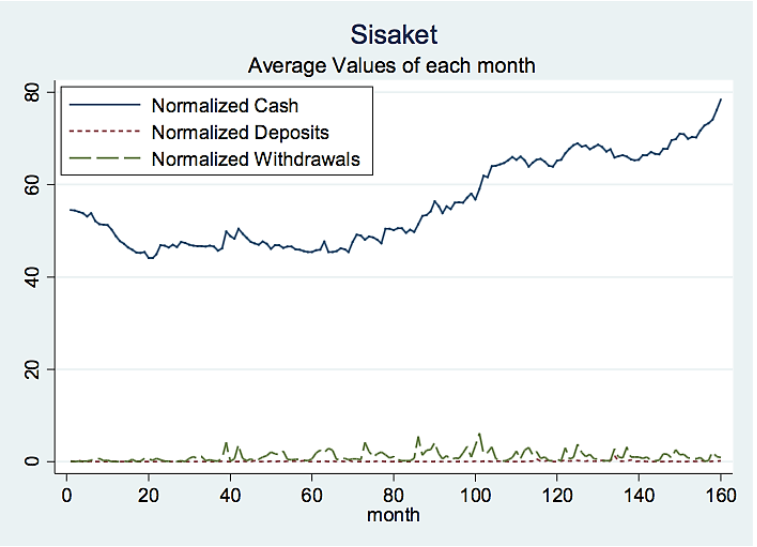
TABLE III
Exchange Matrix for Aurepalle Village[a]

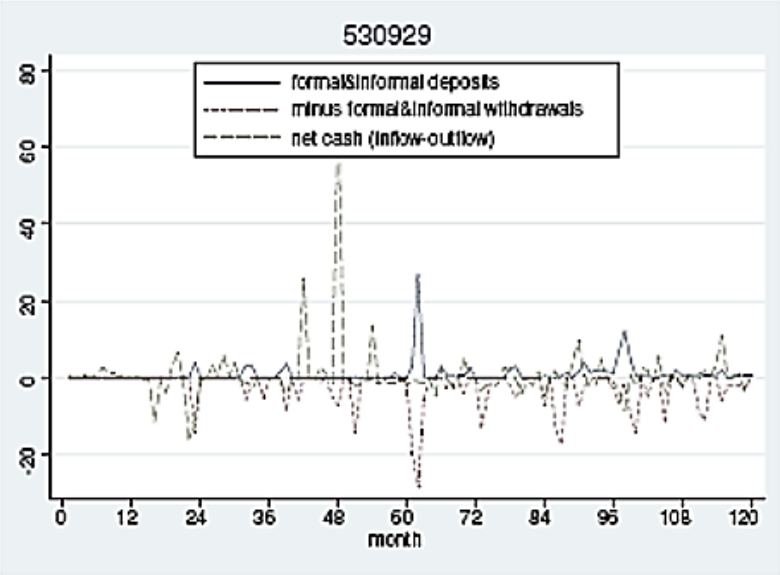
Goods or services out	Goods or services in (value percent)													
	Money	IOU	Grain	Other crops	Food other than crops	Clothing	Other consumptions	Labor	Livestock	Physical assets	Jewelry	Consumer durables	Inputs	Others
Money	·	8.22	2.92	4.99	0.17	1.52	3.87	0.83	2.56	2.69	0.55	2.91	2.30	3.60
IOU	10.00	0.02	0.93	0.20	0.01	0.42	0.15	0.06	0.31	·	0.37	0.24	0.05	0.04
Grain	2.34	2.90	0.04		0.00	0.00	0.03	4.52	0.02	·	·	0.01	·	0.02
Other crops	6.49	0.74	0.00	0.02	0.00	·	·	0.18	0.05	·	·	·	·	0.01
Clothing	·	0.31	·	·	·	·	0.02	0.00	·	·	·	·	·	·
Other consumptions	0.02	·	0.01	·	·	·	·	·	·	·		·	·	·
Labor	1.40	·	4.56	0.16	0.01	0.00	0.00	0.02	0.00	·	·	0.00	·	·
Livestock	3.25	0.16	0.00	0.03	·	·	0.01	0.00	0.22	·	·	·	·	·
Physical assets	6.05	0.49	0.03	·	·	·	·	·	·	·	·	·	·	·
Jewelry	1.09	0.05	·	·	·	·	0.23	·	·	·	·	·	·	·
Consumer durables	0.45	0.23	·	·	·	·	0.02	·	·	·	·	0.06	·	·
Other	10.67	0.00	0.79	0.19	1.19	0.00	0.01	0.01	·	·	·	0.01	·	0.01

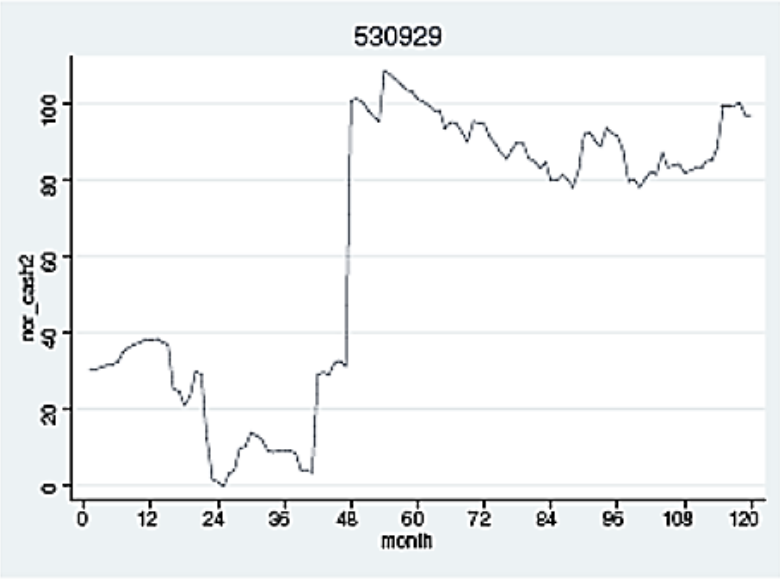
[a] 0.00 denotes a positive number which is rounded to zero. The heavy dot (·) denotes true zeros.

Typical Cash Economy: Thailand

- Heavy cash, not much bank payments, and no e-money
  - Measurement at the household level
  - Even more across village smoothing than within
  - Alvarez, Pawasutipaisit, Townsend





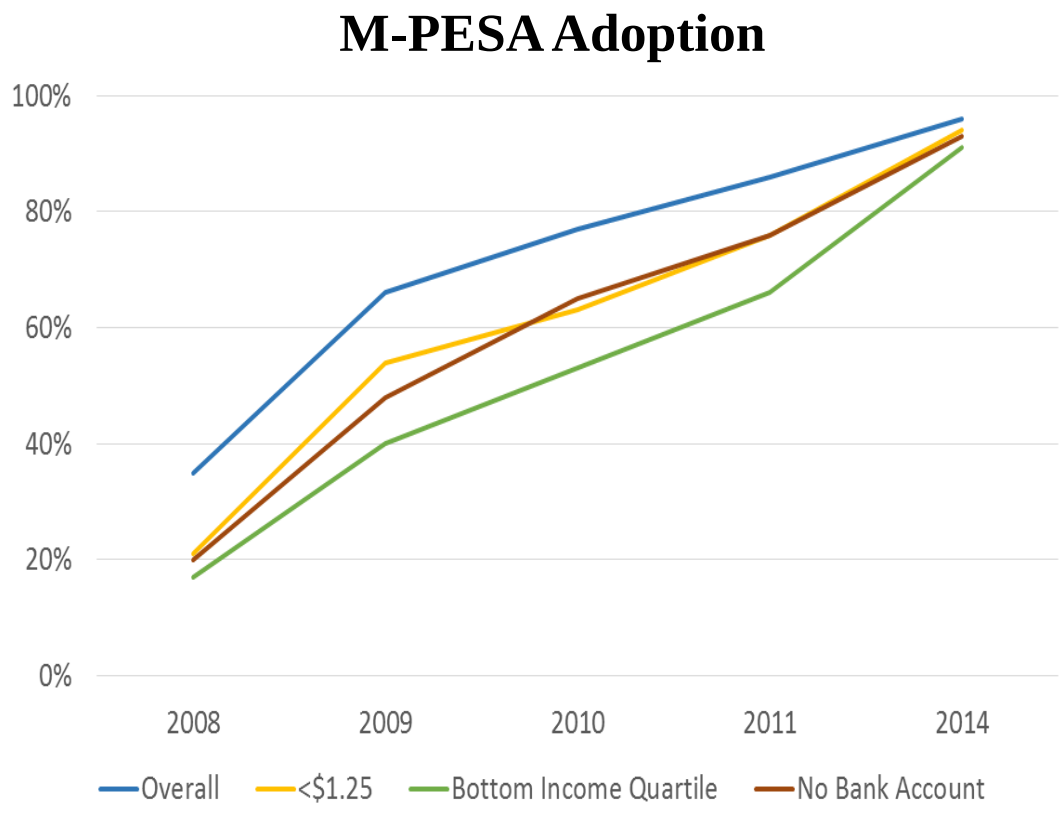


E-money as Basis for New Financial Systems: Huge Policy Interest, Highly Relevant for Thailand

- It comes with the hope that increased financial access can be built on top, thus linking payments to credit and insurance
- An opportunity to build financial markets linked to payments, constructing new financial systems
- A G-20 goal
  - Summit in Korea, November 2010
  - Summit in St. Petersburg, Russia, September 2013
- And many countries
  i. Access to financial services
  ii. Usage of financial services
  iii. The quality of the service delivery

E-money, as in Kenya, including for the poor and the unbanked

- A private sector initiative
- Dramatic rise of electronic payment in Kenya (and some other countries)
  - E-money, from Safaricom

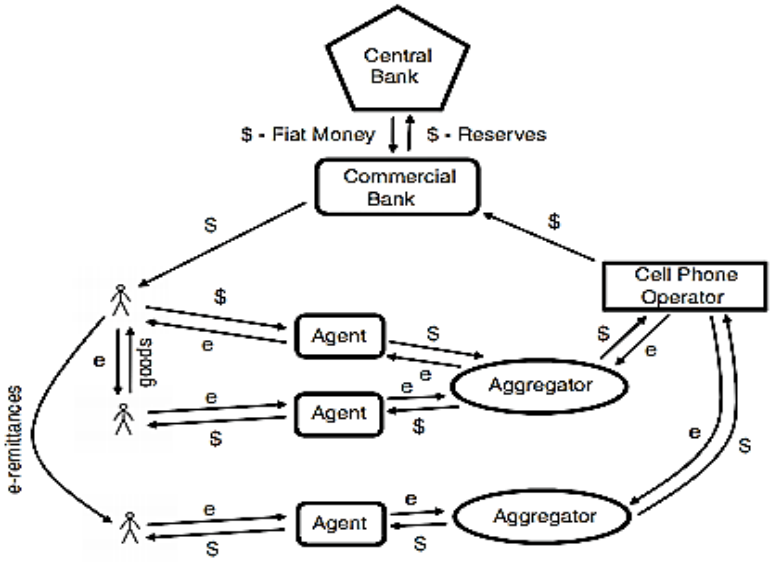


M-Pesa: How It Works, but with an Inevitable Problem

- How it works (for two high velocity objects)
  - Kenya: heavy use of cell-credits coexisting with currency
  - Use of broker dealers as agents
  - Jack, Suri, Townsend
  - Here no net creation, not here, but one can imagine lending with new e-accounts

- Agents as Broker Dealer in Kenya in Late 2008
  - Liquidity, Shortages
  - How often do agents run out?

A Schemata of an e-Payments System (for two high velocity objects)



How often do agents run out?

e-Money	Fraction	Cash	Fraction
More than once a day	3.2 %	More than once a day	3.2%
Once a day	6.4%	Once a day	8.4%
Once a week	14%	Once a week	10%
Once a month	5.6%	Once a month	4.8%
Once every 3 months	1.2%	Once every 3 months	1.2%
Once every 6 months	0.4%	Once every 6 months	0.4%
Less often than that	12%	Less often than that	22.4%
Never	57.2%	Never	49.6%

- Solution: inter-dealer market, it exists but is not well documented

A Unified View: Institutions in the U.S. and in Emerging markets, Get Ahead of Coming Problems, Guidance for Thailand

- Private Liquidity: "Lending Relationships in the interbank market" (Cocco, Gomes, Martins, 2003)
  - Broker-dealers are key traders in private sector: they provide liquidity in the interbank market
  - Relationships among dealers with less correlated liquidity shocks allow insurance against shortage of funds
- Corporate Bonds: "Click or Call: Auction vs. Search in the OTC market" (Hendershott and Madhavan, 2015)
  - Innovative electronic trading technologies, where investors query subsets of dealers by invitation and limited time duration (e.g., the electronic platform MarketAxess)
- Municipal Bond Markets, chains: "Dealer Networks" (Li and Schürhoff, 2014)
  - Use proprietary Transaction Reporting System
  - Dealers intermediate round-trip trades: not only taking the bond into inventory but rather asking the seller to wait until a matching buyer is found. In a round-trip transaction, an investor sells bonds to a dealer, and then the dealer sells the same bonds to another investor or other dealers, arranged in advance. Chains can extend up to 7 dealers.

Integrated View of Measurement: Common Basis, Regardless of the Setting

- Corporate Financial Accounts and Integrated Household/SME Surveys, Samphantharak and Townsend (2009)
  - Transactions-based, get balance sheet, income stmt, and stmt of cash flow
- Federal Reserve Bank of Boston
  - Payments diary and survey - high frequency
- "Integrated Household Financial Surveys: An Assessment of U.S. Methods and Innovation" Samphantharak, Schuh and Townsend (2016)
  - Innovation: combine payments with integrated financial accounts
- Evaluation of US data sets, below

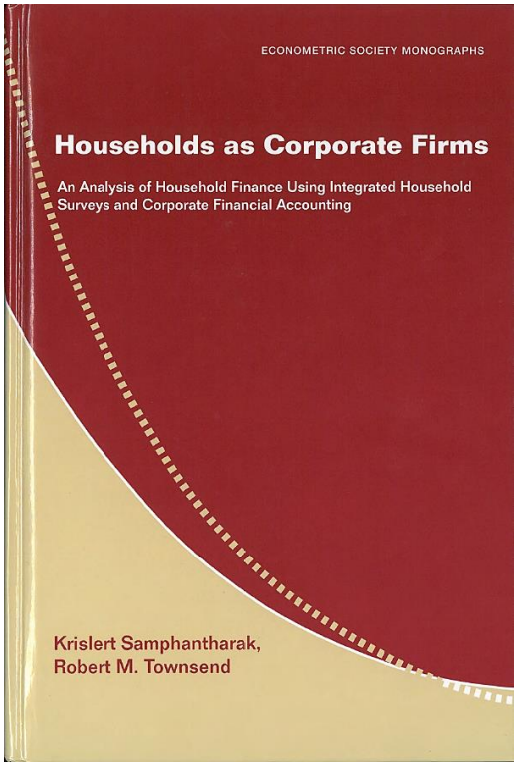


TABLE 4
Statements of Cash Flows

(Cash defined as Current Assets)	PSID 2010-2012	CES 2011-2012	SCF 2010-2013	HRS 2010-2012	SIPP 2010-2011
Change in Cash Holding (from Statement of Cash Flows)	25,452	19,715	51,247	21,303	59,424
Change in Cash Holding (from Statement of Balance Sheet)	3,091	17,770	3,843	1,678	-2,095
Cash flow error	22,362	1,945	47,404	19,625	61,519
Internal Error	25%	4%	37%	16%	51%
External Error	30%	2%	61%	26%	84%

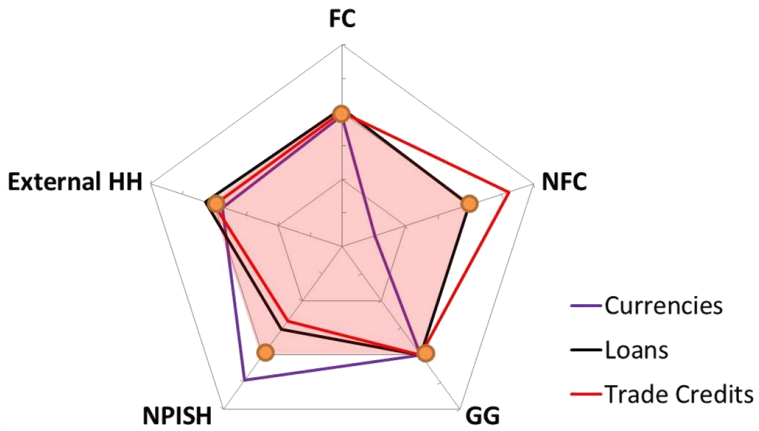
Innovation: Statement of Liquidity Flows as Part of Financial Accounts. Next step for Thailand, enhanced integrated surveys

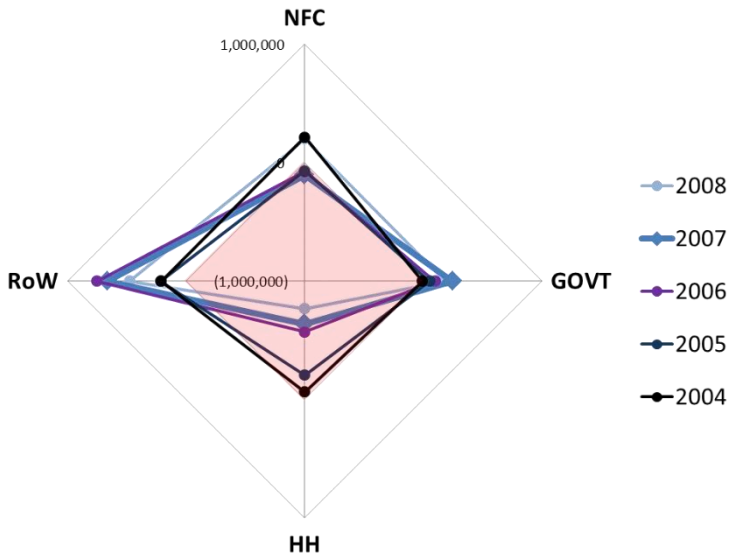
Table 7
Statement of Account Flows

	Currency	DDA	Revolving debt	NFDA	Foreign currency	Long-term assets	Other debt	All
Net income	***5,047***	***67,869***	**na**	**na**	**na**	**na**	**na**	**72,916**
Consumption and investment	**-11,761**	**-57,436**	**-14,131**	**-689**	**na**	**-**	**na**	**-84,073**
Consumption expenditure	-11,761	-57,436	-14,131	-689	na	-	na	-84,073
Capital (durable goods) expenditure	na	na	na	na	na	-	na	na
Net transfers	**-1,359**	**-6,025**	**-514**	**-6**	**23**	**na**	**7,881**	**0**
Deposits (inflows)	**6,082**	**7,140**	**na**	**245**	**23**	**na**	**7,881**	**21,371**
From currency	-	7,140	na	*182*	23	na	*96*	7,441
From demand deposits	5,568	-	na	24	na	na	*7,573*	13,165
From revolving accounts	263	na	-	39	na	na	*212*	514
From non-financial deposit accounts	251	na	na	-	na	na	0	251
From foreign currency	0	na	na	na	-	na	na	0
From long-term assets	na	na	na	na	na	-	na	0
From other debt	na	na	na	na	na	na	-	0
Withdrawals (outflows)	**-7,441**	**-13,165**	**-514**	**-251**	**0**	**na**	**na**	**-21,371**
To currency	-	-5,568	-263	-251	0	na	na	-6,082
To demand deposits	-7,140	-	na	na	na	na	na	-7,140
To revolving accounts	na	na	-	na	na	na	na	0
To non-financial deposit accounts	*-182*	-24	-39	-	na	na	na	-245
To foreign currency	-23	na	na	na	-	na	na	-23
To long-term assets	na	na	na	na	na	-	na	0
To other debt	*-96*	-7,573	-212	0	na	na	-	-7,881
Change in account balance (from Statement of Account Flows)	-8,073	4,408	-14,645	-695	23	na	7,881	-11,157
Change in account balance (from Balance Sheets)	164	na	-673	na	na	-4,501	9,489	-8,816
Flow error	-8,237	na	-13,972	na	na	na	-1,608	-2,341
Error (% lagged account balance)	1226%	na	2079%	na	na	na	2%	1%

Common Framework for Measurement: An Integrated View Within Economies

- Need to link household retail and SME to financial institutions, broker dealers, and markets
- Measurement to be done at all levels, within and across sectors, geography, and markets
- Up and down tthe intermediation chain: macro back down to micro markets, micro data back up to macro
- Below is just an example by geography; more can be done within Thailand, NESDB





- NFI = Net Acquisition of Financial Assets (NAFA) – Net Incurrence of Liabilities (NIL)

$$NAFA - NIL = GS - CF$$

(Financial) Surplus	Gross Savings – Expenditures on Capital

Need for a Unified Theoretical Framework: Frictions in General Equilibrium

- Obstacles
  - Transaction costs
  - Random market participation and search
  - Limited communication
  - Information/complexity/record keeping
  - Spatial separation and related segmentation
  - Limited commitment
  - And combinations thereof
- Content for each of the following sections
  - If the world were like the model, with the obstacle, what do we learn?
  - Match to relevance episodes in economic history or contemporary institutions in various countries
  - Featuring measurement dictated by the model, if available, or what would be needed
  - Policy implications
- This is what you can expect to happen, problems to be anticipated now, hence policy guidance

1. Risk In Liquidity and Clearing: Deferred Payment and Credit, Trade Fails, Penalties and Systemic Risk

- In theory, if guaranteed full payment despite purchases before sales, things can be fine.
- In historical systems, trade fairs, arbitrary unit of account worked like this.
- In practice, inability to pay means either deferred settlement as in end-of-period, or multiple periods, bills of exchange, or default.
- We do see trade fails in practice, US treasuries.
- In theory, design interlinked system (Dubey 1982) with right incentives and penalties linked across markets.
- Related problems with payments systems: two studies by and for Central Banks
  - Systematic risk in payments
  - Computer science complexity in clearing
- Theory as a conceptual framework can help to guide a new design: think through and assess current Thai financial system in terms of default, intra-period credit, penalties for trade fails, and systemic payment risk
- Measurement goes hand in hand with this
  - New payments surveys retail would be part, but not all, include wholesale surveys or existing data and financial markets data
  - Proposed integrated data project for Thailand; starting with existing data, then fill in gaps

2. Innovations in Financial Systems, e-Payments, and Monetary Policy

- Limited communication and record keeping
- Distributed ledger technology
- Emergence of private and public e-money

- One aspect of limited liquidity has to with achieving desirable target allocations when trades are decentralized pairwise or across markets
  - An impossibility theorem unless there is very high liquidity or a massive central warehouse of goods and securities.
    - Unlikely or costly
- Remedy: Centralized record keeping as now allowed by DLT
  - Build on e-money, Bitcoin technology for private sector systems, retail
- Help wholesale markets in the design of new integrated yet decentralized platforms for trade, clearing, and settlement
- Both retail and wholesale and thus possible next steps for Thailand

3. High Velocity Private and Public Debt

- Spatially separated agents or equivalent segmentation
- Gives rise to high velocity circulating private
  - Some held to maturity, some allowing trade in other markets like medium of exchange
- Other things equal this is good, better private sector intermediation

- But, there can be coordination problems
- Financial crashes as in England money market in bills which gave rise to Bank of England
- These problems can be anticipated and there are solutions, coordination in which objects are used

- High velocity public debt, US treasuries, as money
- Has reverse implications for monetary policy, be mindful

4. Financial Fragmentation and Centrality: A Corrected Measure

- Fragmentation by market, asset, and/or trader
  - Key marginal values in liquidity provision
  - Notions of financial centrality
- Thin markets are a problem, like coordination over trading posts
- Need to coordinate in going to the market to make sure it is thick
- In practice, we see this in coordination in securities trade
  - In US, on-the-run treasuries
- Fragmentation by trader: Key traders who are in the market when needed most
  - A different economic notion of financial centrality
  - latter used widely in regulation for systemic risk
  - but getting the economics wrong, economic value of liquidity, more valued when needed most
  - Use this new measure
  - its quite operational with data- can be extended to include directing liquidity from central bank
- Analogy between within-village money market and high value money markets, Gabrieli and Georg (2016), Europe interbank.
  - Remarkably Thai villagers do it, value key traders, at least implicitly.

Financial Intermediation, e-Platforms: Innovation & Regulation

- How to regulate, as after a crisis
  - Shadow banks, are bad?
- Financial innovations with new technology
  - Non-bank financial infrastructure, a hugh opportunity
- The nuanced hybrid
  - e-Technology going hand-in-hand with more mundane financial innovation that was needed but prevented by previous regulation.
  - Time to reassess, do not block innovation based on outdated regulations that need to be rethought and revised.
  - Financial regulation for the new e-economy

Fundamental Premise and Method

- Economic theory provides guidance from first principles on financial intermediation, in particular on the design and operation of e-platforms
- This is prescriptive, what we ought to have, a new theory-based regulation. Blue prints
- Basis of judgement
  - Nature of institutions, markets, industrial organization
  - Data/outcomes
    - Where possible use theory with existing data to do an evaluation of what is there now
    - Also highlight the kinds of data that are needed if we do not have them now.
    - The latter is an important point for Thailand

Motivation from the US: Centralize and Regulate

- Operational Implications of Crisis, Policy Language: Move decentralized OTC markets into exchanges with central counter parties (CCP)
  - That stand in the middle of transactions, to provide transparency, liquidity, netting, and reduced risk
  - This seductive language, but what does it mean, really, and why is this the right thing to do?
- The CCP industry typically exhibits network externalities
  - Which means that the value of the services offered by a clearing system to an investor depends on the number of investors purchasing the same services. Another example, buyers like having lots of sellers
- The CCP industry exhibits important economies of scale
  - Which means that the average cost per transaction declines with an increase in the number of transactions. The information technology infrastructure, such as a database engine, the clearing platform, networks and interfaces, have high fixed costs.
- A single provider might have the lowest costs
  - But it might also have significant market power, thus, might need to be regulated in a manner similar to a public utility.
- Bottom line summary of issues that need to be considered
  - Externalities, Economies Of Scale, Market Power
- Duffie and Zhu (2009) "Does a Central Clearing Counterparty Reduce Counterparty Risk?"
- Duffie, D. (2014) "Financial Market Infrastructure: Too Important to Fail"
- Method of judgment: presumed key elements in economic theory

Motivation from the US: Fragmentation May Be Helpful

- O'Hara and Ye (2009): "Is Market Fragmentation Harming Market Quality?"
- Striking changes in U.S. equity markets has been the proliferation of trading venues.
  - Ranging from electronic platforms such as ECNS (electronic communication networks) and ATS (alternative trading systems), to the trading desks of broker/dealer firms
- Fragmentation is associated with higher speed, lower transaction costs, and greater market efficiency, in that prices are closer to being a random walk (despite more volatility)
- Consistent with US markets being a single virtual market with multiple points of entry *which is an interesting way to put things*
- Bottom line summary of the issue to be addressed
  - How do 'markets' work, in particular does competition across platforms make the system as a whole work better?
  - Should there be one or many?
- The method of judgment here is data-based: using newly available trade reporting facilities (TRFs)
  - Thailand ?

Motivation from China

- Expansion of e-commerce, for goods and services
  - $314 b. in 2013 (surpassed the US), now 1.63 trillion approx.
    - From 2008 to 2013, expanded at 70% per year
  - B2B
    - Buying and selling among wholesalers and some manufacturers, prime example is Alibaba
    - e- Records use in lending arm, with punishment
    - B2C, C2C
    - Taobao (China's ebay), Alipay
  - Concentrated in richest and biggest cities, but quickly expanding in lower tier cities and rural area
- P2P borrowing/loans, market place exchanges
  - Thousands of platforms
  - Number of failures is non-trivial
    - Underlying information backing loans seems limited, and there is fraud
- Method of Judgment
  - Institutional facts
  - On data: None of China-version for PSID, SCF are integrated with e-commerce
    - Thailand might not want to make the mistake of not having data

Latest Regulation for P2P from China

- Government increasingly regulating these exchanges
  - P2P will use registration system
  - P2P not allowed to engage in asset securitization or packaged assets
  - A single natural person in a platform can borrow no more than 200.000 yuan (30K USD); in a number of platforms borrowing limit of 1M yuan (140 USD)
  - P2P shall not provide security for lender nor promise/imply fixed income to borrower
- These regulations are not based on first principles. China's new regulations are not something to imitate
- Frameworks to be considered below provide the correct recommendations: Deal with registration, borrowing from multiple sources, when platform should be the opposite of pass-through, rather, an active go-between
  - In managing portfolio
  - Information control
  - Securitization
- Considered below: Concerns about financial stability, but China not dealing with it directly
  - There is a way to do it in appropriate design of markets to deal with pecuniary externalities.
  - Thailand, a motivation thinking through the vision for financial markets now. Financial innovation and Regulations for Systemic Risk. Here these go hand in hand and are complements. Without new markets the risk remains,

Motivation Mexico and India: Innovation on the Edges in Receivables

- A successful example of reverse factoring is Nafin in Mexico, which created an Internet-based market infrastructure to facilitate online-factoring services to SME suppliers
  - Supplier financing: Sale of credit-worthy accounts receivable at a discount (interest rate plus service fee) in exchange for immediate cash
  - The lender purchases accounts receivables only from specific information-transparent, high-quality buyers
  - Credit risk is equal to the default risk of the high-quality customer as buyer, not the risky SMEs as seller:
  - 98% of all services provided electronically
- Reserve Bank of India granted 'in-principle' approval to set up and operate Trade Receivables Discounted System (TReDS)
  - NSICL and SIDBI: have government backing and tie up with state-owned banks
  - Axis Bank (private bank) and Mynt Solutions
  - Interest rate determination will be type of market-based price discovery through the bidding process
- Bottom line issue to be addressed
  - Do innovations happen on their own?
    - Note the role of government in both Mexico and India
    - Is everything needed going to happen given current regulation and important but piece-meal innovation?
  - Or do financial systems get stuck due to lack of coordination, despite competition?
    - Is Thai regulation overdrawing distinction between credit and insurance exacerbating the problem.
- Method: innovation introduced without a data tracking system. So far, no data gathered to monitor and assess, though I am part of an evaluation team with Central Bank.
- Thailand should consider this innovation but with data tracking system and caveats about piece-meal aspects of it.

Back to the U.S.: Market Places Exchanges

Morrison Foerster: "Lending Basics: How It Works, Current Regulations and Considerations"

- Although the majority of P2P lending is for mortgages and credit card refinancing, as in Lending Club and Prosper, some P2P lending platforms focus on particular segments of the consumer lending market, including small-business lending (OnDeck, Funding Circle, Kabbage), student loans (SoFi, Kiva), low income entrepreneurs (Kiva), and younger borrowers (Upstart).
- P2P lending platforms typically issue loans in amounts ranging from $1,000 to $35,000 with fixed interest rates and maturities of three to five years – used to be some bidding, for loans, not lately.
  - Before a loan is posted on a platform's website, a prospective borrower submits an application to the platform for consideration.
  - The platform obtains a credit report on the applicant and uses this information, along with other data (e.g., loan characteristics) in proprietary models to assign a risk grade to the proposed loan and set an interest rate corresponding to the assigned risk grade.
  - If accepted, a loan request is posted on the platform's website, where investors can review all loans or search for specific loans that meet their desired risk/return characteristics.
  - A single loan is typically divided into many pieces to allow investors to diversify their portfolio and distribute the default risk among multiple investors
  - The platform receives a fee on the loan, as well as origination and servicing fees, before lending the remaining proceeds to the underlying borrower.

U.S. Regulatory View, No Clear Framework

- Consumer credit, whether bank-originated or otherwise, is subject to an extensive web of federal and state laws
  - Truth in Lending Act – Equal Credit Opportunity Act – Fair Credit Reporting Act – Gramm-Leach-Bliley Act – Electronic Fund Transfer Act – Bank Secrecy Act – Fair Debt Collection Practices Act
- In addition to consumer credit regulations, the funding side of P2P lending platforms is subject to SEC regulation.
  - In Nov. 2008, the SEC issued a "cease and desist" order to P2P lending platform Prosper Marketplace, indicating that notes issued by Prosper were unregistered securities.
- Official acknowledgement of the confusing overlapping jurisdiction of multiple regulatory agencies
  - GAO report outlined two approaches to the future regulation of P2P lending on the federal level: A SEC-centered approach vs. a Consumer Financial Protection Bureau, CFPB approach. The GAO did not make any firm recommendations
- Recent OCC proposal to be regulator
- Bottom line and issue to be considered
  - Issues: diverse financial landscape, diverse products, scattered regulation. this should be avoided.
  - US is not the role model.
  - think more deeply in general equilibrium
- Method of judgment: Data used to evaluate U.S. platforms is scare – internal operation systems, internet traffic on the platform, credit registry data, in principle; but not linked to on the ground surveys of households and communities – behavior inferred at best, lots of holes
  - Collaboration with Lending Club and Fin Techs in the US
- Thailand can avoid this problem if start now- a Framework for Regulation and Plans for Data

Core Theory for the Design and Regulation of Financial Platforms: Method of Analysis

- Premise: Inherently a general equilibrium, systems question
- Environment: Commodity space, preferences, endowment, technology
- Key frictions: Transactions costs, externalities, limited commitment, private information
  - Crucial combinations of costs and these frictions
- Program: Constrained optimal design, optimum problems with obstacles
- Decentralization: Potential issues
  - Standard welfare theorems, or something with a twist
- In this sense, first principles: We are not taking markets and institutions as given

1. The new e-world: Exchange Rules, Market Configurations That Work or Need a Remedy

- Exchange rules that work, for general environments and even for small numbers of agents, ideas from theory that could be used here
  - Wilson: Centralized auctioneer and core blocking in multi commodity auctions
  - Dubey: Limit orders, bargaining with or epsilon–disinterested dealer and with penalties –design of payments system
- Auctions: Using theory to design and implement (at least as an approximation) spectrum auctions, opportunity for Thailand in financial markets
  - Ausubel: Interconnections across markets, e.g., multi good auctions, tatonement
  - Ausubel, Cramton, Milgrom: Core-selecting auctions and approximations
- Price competition across exchanges, Townsend – two ways that work with warnings
  - Arbitrage across OTC markets is fine
    - But be careful about coordination across exchanges in timing, high frequency traders
  - With exclusivity, single franchise still works
    - But some forms of exclusivity can be bad, e.g., auctions for CDS
- Industrial organization, competition, and market exchange configurations that do not work, hence do not allow, this is an example of where regulation comes from. but with fixes
  - Makoswski, Pesendorfer: Coordination across financial institutions with different costs- otherwise can get stuck, remedy, make sure gains across markets and instituions are in the calculation and coordination by regulator.
  - Yanelle: timing in the acquisition and disbursement of funds
    - An IO question
    - Remedy, put latter first, also a problem in China
  - Summer et al.: Endogenous leverage and assets
    - A myopic behavioral question
    - Remedy, make sure we have markets pairwise
    - Important to think about crises

2. Platforms Incorporating Obstacles to Trade

- Guidelines for contracts and trading rules on platforms
- Information-constrained optima: Otherwise enigmatic institutional forms can actually be good
  - Relationship lending
    - Contracts traded on a platform should have contingencies that allow for flexibility and tie-ins over time
    - We see these in other context, but not yet here, yet? Can help design
  - Concealment
    - Role of platform is to intermediate across multiple borrowers and investors, and controlling information flows can be part of this
    - China, new regulation does not fit this, for example. Thai can do better
  - Delegation
    - Platform acts on behalf of investors/borrowers, managing their portfolios for them
    - China does not fit, again. Thai can do better
  - We see these in practice in Thai data, and in other countries, financial info-regimes
    - Karaivanov and Townsend, Thailand (2014)
    - Joaquim, Keniston, Suarina, Townsend- Bank of Spain (2017)
  - IO competition in constrained optimal contracts can get good local outcomes Joaquim, Townsend, Zhorin (2017) Assuncao, Mityakov, Townsend (2017)

3. Broker-Dealers As Platforms and part of Competitive Framework, Allow it

- Markets with imperfect information as a rationale for policy
  - Sometimes quite misleading or even incorrect rational for policy intervention
- GE Walrasian theory with platforms can often work well if contracts and markets are designed properly and correct competition is allowedf- so just do the latter
- Contracts with options, pricing individual components and the total
- broker-dealers do the pooling
- Welfare theorems hold in many environments with private information after contracting, and some ex-ante private information on valuations, too
- Endogenous industrial and financial organization-group entities
  - Motivation from development: Cropping groups
    - Multiple tenants pool risk and resources and jointly farm the land of a single landowner under either a fixed or share-rent contract
  - Motivation from NY markets: Contemporary security performance
    - Ashcraft, Gooriah and Kermani (2014). "Does Skin-in-the-Game Affect Security Performance?"

4. Financial Platforms: One, Many or Tiered and Regulatory Guidance--How To Mitigate Systemic Risk and Supervise

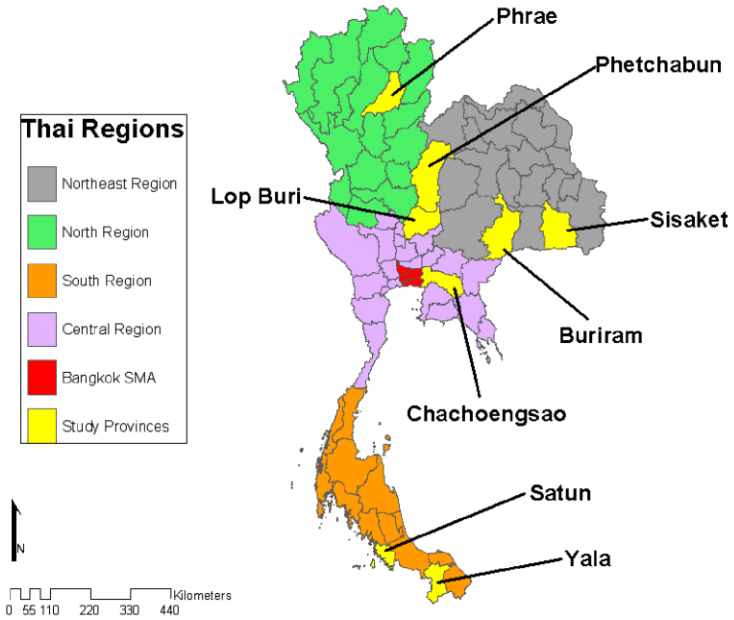
- Identifying key obstacles and features of the environment
- How platforms ought to function; Sharpen awareness of what theory dictates are these key features, ideally to be measured; Combinations of obstacles and technology/costs
- In what sense need centralized regulation and when; a policy research agenda

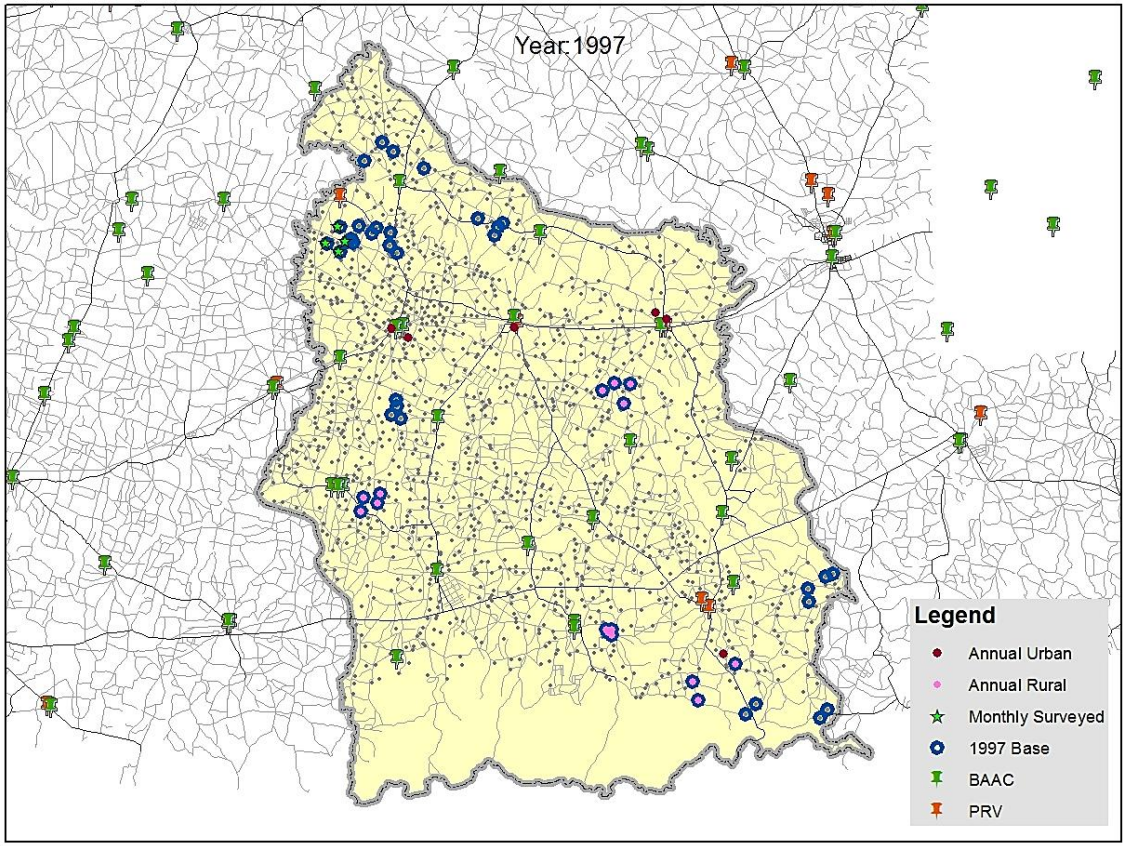
- Single platform
  - Large scale, monitoring costs, limited communication and aggregate risk
  - Credit registry and prioritization across investors (if unobserved borrower actions)
  - Macro aggregate risks with non-convex scales
- Multiple platforms
  - Networks costs and benefits: Transaction costs vs. risk diversification
  - Two-sided markets, large numbers, externalities but not a problem with correct design, endogenous interchange prices
  - Remedies for fire sales and other pecuniary externalities-financial stability-see below
- Hybrid mediation
  - Joint liability, individuals vs. groups - Thai Data
  - Costly communication and costly state verification - fire walls tiered over states
  - Rotating mediators and supervisor: Private information and moral hazard- sere below

- Remedies for Pre-existing Systemic Risk and Suggestions for Supervision and Monitoring

Data on the Ground: Townsend Thai Project

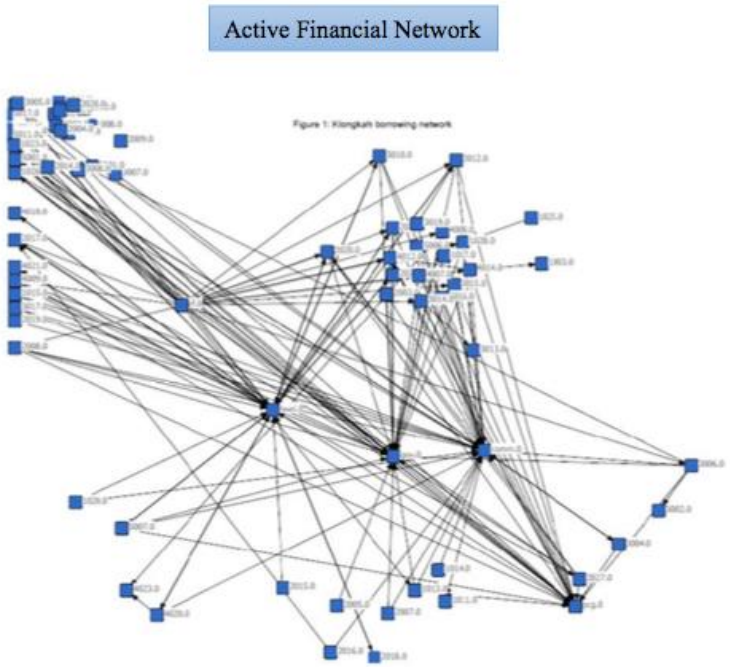
- Annual
  - Started in rural areas in 1997 with 192 villages
  - Resurvey in 64 villages every year since 1998
  - Expanded to North and South in 2003 and 2004
- Urban
  - Extended to Urban Areas in 2005
- Monthly
  - Started in 1998, 720 new households
  - Survey Design, 16 villages





Analysis Using Data and Theory

- Findings from Townsend Thai Project (from micro data, direct outcomes: What is working well and what is not
  - Working well: risk sharing, informal gifts, networks,– Chiappori, Schulhofer-Wohl, pricing of risk) - Samphantarak and Townsend (2013)
  - Less obvious: flow of funds for investment, very slow, SME's with high rates of return and little debt – Pawasutipaisit and Townsend (2011)
  - In progress: labor supply (Bohnomme, Chiappori and Townsend), disability shocks (Hendry Shanoy and Townsend) life cycle (Henrique and Townsend), rental vs. credit (Rampini and Townsend); all in progress. More lessons to be learned.



  - Informal institutions – village money market
  - Kinnan and Townsend (2012): consumption smoothing
  - Sripakdeevong and Townsend (2016): village money market
    - Borrow to repay, borrow to lend
    - Delayed repayment goes back through the credit chain
    - Repay early goes back through credit chain, even more so
    - Those linked in gifts and loans when links are otherwise thin
    - Those trading when markets are thin get rewarded

Introduction of Enhanced Intermediation: past, present, and future

- Village funds/financial innovation and impact
  - Kaboski and Townsend (2011), "A Structural Evaluation of Large Scale Quasi-Experimental Microfinance Initiative" *Econometrica*
  - Kaboski and Townsend (2011), "The Impact of Credit on Village Economies" *American Economic Journal: Applied Economics*
- New evidence: Village fund interventions were a catalyst helping local intermediation – Ru and Townsend (2016)
- P2P platforms and other intermediation systems, formal/informal nexus
  - Platforms from the ground up
    - Start at the village/town level, as in Townsend Thai surveys, using data and this research base
    - Then, villages and regions be better linked to one another?
- The Big Question: How would one design ex-ante optimal system
  - Not simply questions for Thailand, but much more generally, in this talk
  - Again think models for entire economies, general equilibrium

Conclusions: Design of Financial Systems

- How would one design ex-ante optimal system
- Factors to take into consideration
  - Experience in other countries, yes, in part, but find shortcomings in each and not something to imitate. Not China, nor US, nor India
  - Another way- policy comes from resarch, and the good news, many pieces are done and can be incorporated now, as shared in this talk
  - Used conceptual frameworks to shed light on potential, likely problems, and guidance
    - In liquidity and monetary policy
    - In operation and number/types of financial e-platforms
- Anticipate, create now a long run plan, problems and issues which will likely occur
- Proceeding piecemeal can create a legacy system, which then becomes an obstacle to innovation and efficiency in the future.
  - Sandbox terminology, danger is that it can be be shortsighted and not system wide.
- Importance of Measurement
  - Comprehensive mapping, macro and micro, up and down the liquidity and intermediation chains, household and SME to high value trades across institutions and back again
  - Build on Townsend Thai project with surveys like those of TFRP
    - Invaluable data-
    - Should continue surveys like this in some way and indeed take to the next level